THE EMERGING HIGH-TECH INDUSTRY: THE JOBS KEEP COMING

Introduction

The American Worker Project's first case study examines the innovative high-tech industry. Thanks to this industry, we live in an age in which more people surf on the Internet than on water. If the price of a $10,000 automobile bought in 1975 declined as rapidly as computers, a car would have cost 45 cents in 1995.[1] The industry responsible for these innovations is changing the way Americans do business everywhere. It is changing the way Americans live everywhere.

The American Electronics Association defined 45 high-tech industries and published statistics which included:

- 4.3 million workers employed in 1996.
- 1.9 million of those employed in manufacturing, larger than any other industry.
- The high-tech industry represented 6.1 percent of U.S. Gross Domestic Product in 1996.
- $49,586 average wage annually to high-tech worker in 1996, as compared to $28,600 for a private-sector non-high-tech worker.
- $866 billion in sales in 1996, larger than any other industry.
- Sales grew 57 percent between 1990 and 1996.
- $150 billion in goods exported in 1996, making it the nation's leading exporter.

The growth of the Silicon Valley, the high-tech industry capital of the world, has been equally impressive:

- Eleven companies are created every week.[2]
- Production of computers and semiconductors account for 45 percent of U.S. industrial growth.[3]
- Wages grew 5.1 percent in 1996, five times the national average.[4]

The Culture Clash: High-Tech Versus the Public Sector

The perception of employees in the high-tech sector and the public sector could hardly be more different. In the high-tech sector where product cycles occur every 90 days (one web year), entrepreneurs risk failure everyday on new and innovative ideas. They prefer failure to not trying, seeing risk as the means to achieve increased productivity and efficiency. The company culture breeds energetic employees willing to work long hours to finish products. In this environment, employees are viewed as individuals who are judged on merit and the intellectual assets they bring to their companies. Their loyalty is not assumed; it is cultivated with constant training and upgrading of skills, generous pay, and lucrative benefits.

The public sector is still trying to cope with the existence of the new kid on the block, the high-tech sector. As the public sector slowly creates and enforces laws and regulations, it clashes with the fast-paced, innovative high-tech sector. And while the high-tech industry prepares itself for the challenges of the next century, the public sector still clings to workplace laws intended for the economy of the first half of the century.

Issues of Concern to the High-Tech Industry

The high-tech industry is currently lobbying to have a number of workplace laws abolished or changed. Here are some of the issues that pertain to those laws:

- Skills Gap: According to employers in the high-tech industry, too few Americans possess the skills to fill many of the available jobs. The gap is largely attributed to an inadequate education system. The result is that employers are looking overseas to meet immediate high-tech skills needs, and the federal government has responded with a dramatic increase in the H-1B visa cap.

- Flexible Work Arrangements: Technological advances and changing social demographics have contributed to an increase in workers preferring flexible work schedule arrangements. With more women in the workplace, more workers have child-care responsibilities. Since some high-tech jobs don't require the worker be physically present at the work-site, more workers prefer to conduct business at home. Many high-tech companies are willing to accommodate worker requests, but the Fair Labor Standards Act and other workplace laws prevent them from doing so. Other industries are also affected adversely by these workplace laws which will be discussed in detail throughout this report.

- Retention of Valuable Workers: In the competitive high-tech industry where jobs are now plentiful and the workers to fill them are not, companies are fiercely competing against each other to retain their best workers. The Innovative Workplace Section of this report details some of the lengths companies will go in order to keep their best workers. Unfortunately, some of the benefits companies want to bestow on their workers fall within the "gray" areas of the law. Whether it is workers' compensation, training, or retirement benefits, many companies have to hire scores of lawyers to figure ways around the law to reward their employees appropriately. Some small businesses do not bother trying.

The Rise of the Internet

One of the most surprising developments in the high-tech industry has been the rise of the Internet. A few statistics highlight the significance of the Internet as a valuable business tool:

- Electronic commerce is expected to reach about $350 billion by 2002, from an estimated $22 billion this year.[5]

- The Internet reduces costs of sales 5 to 10 percent.[6]

- Forty-five percent of U.S. households now own a PC, while 60 percent of homes with children have PCs.[7]

- *Business Week* estimates that doing business on the Internet could boost the nation's gross domestic product by $10 billion-$20 billion annually by 2002.[8]

Taxes and the Internet

Clearly, these statistics indicate the importance of the Internet to the American economy. One result has been state and federal debate on options for taxing Internet. If the U.S. government intends to create the ideal work environment for business, especially in the rapidly growing Internet realm, it obviously should review the kind of taxation that has stifled economic growth elsewhere.

High-Tech Research and Development

Research and development ("R&D") funding for the high-tech industry is also likely to be a widely debated issue in the coming years. (Data are not available for a comparison of R&D funding by industry among nations. Only a comparison of total funding is available.) There has been a trend toward greater private sector spending on R&D and less government spending. In 1996, U.S. companies spent $113 billion (62 percent) on R&D as compared to $61.9 billion (34 percent) by government, an all-time low. Detailed information on R&D spending by the industry for 1995 shows that high-tech companies spent $40 billion (37 percent) of the $109 billion spent by all companies on R&D funding. High-tech companies were spending 42 percent more on R&D funding than in 1990.[9]

The U.S. should consider its current investment in research and development. As a percentage of the gross domestic product, Japan expends more on non-defense R&D than the U.S. Japan has pledged from 1995 to 2000 to double its R&D funding every year. So far, Japan is following course. China plans to triple its R&D by 2000.[10] For the first time in the postwar era, the U.S. could enter the 21st Century spending less on R&D than its competitors.[11]

Proponents of government spending claim that it provides long-term benefits not just to the high-tech industry, but to all Americans. Opponents argue that government shouldn't be subsidizing what very profitable private sector corporations can afford on their own. The FY 1999 Omnibus Appropriations Act contains an extension of the R& D tax credit through June 1999. The government must establish a clearly thought out and consistent policy on this issue.

High-Tech Job Projection and Worker Shortages

Perhaps the most worrisome trend in the U.S. high-tech industry is the gap between the number of available jobs expected and the number of workers able to fill them. The gap will continue as long as the high-tech industry continues its rapid growth, and fewer and fewer undergraduate and graduate students are majoring in technical fields.

The following data are an estimate of claimed vacancies for information technology jobs (in this case: programmers, systems analysts, and computer engineers/scientists) across 104,000 U.S. companies with 100 or more employees:

- There are currently 346,000 vacant information technology jobs available.[12]
- There are approximately three vacancies per company.[13]
- There is one vacancy for every ten employees in information technology.[14]

Businesses unable to find employees with the necessary skill levels often suffer, as does the economy. One case study of an electronics component manufacturer seeking to open a new plant in Pennsylvania exemplifies the problem:

- Due to skill shortages, the company decreased its hiring plans by one-third.[15]
- Total personal income would have been 30 percent higher if the company had hired the number of people called for in the original plan, resulting in more tax dollars for the public sector and more income within the local economy.[16]

Future job growth in the high-tech sector is expected to explode:

- The computer and office equipment industry is projected to be the fastest growing industry between 1996 and 2006, with an annual growth rate of nearly 15 percent.[17]
- Jobs for database administrators, computer support specialists, and computer scientists are expected to increase by 118 percent by 2006.[18]
- Jobs for computer engineers are expected to jump 109 percent by 2006.[19]
- Jobs for system analysts will double, totaling more than 1 million by 2006.[20]

Unfortunately, the numbers of U.S. citizens who will be qualified to fill these jobs are rapidly declining. Fewer and fewer Americans are graduating with adequate technical training:

- Between 1985 and 1997, the number of bachelor's degrees awarded to engineering majors decreased 16 percent.[21]

- Between 1985 and 1995, the number of bachelor's degrees awarded to mathematics/computer science majors decreased 29 percent.[22]

- In 1997, 48 percent of all Ph.D.s, 42 percent of master's degrees, and 11 percent of bachelor's degrees in computer engineering and electrical and electronic engineering given by U.S. universities were awarded to foreign nationals.[23]

- A recent study shows that only 3 percent of high school graduates want to enter a computer related field after high school.[24]

The Future of High-Tech

The high-tech industry will continue to grow and the United States should take advantage of its growth. A few facts demonstrate why:

- In a 1998 survey, 35 percent of all U.S. adults said they use the Internet, an increase of 340 percent from three years ago.[25]

- The U.S. leads the world in computer use. Between 1991 and 1996, computer use increased 73 percent, representing 36 percent of computers used worldwide.[26]

- By the year 2000, computer use in the U.S. is projected to reach 161 million, up from 107 million in 1996.[27]

Findings and Recommendations

In the high-tech industry, products are not limited by time and distance. Products can be developed anywhere in the world and be delivered almost instantaneously via computer. The origin of such products is transparent to businesses and to the ultimate consumer. These dynamics create incredible challenges and opportunities for America in the 21st Century.

If America is to continue to be competitive in the 21st Century, it must embrace economic change. Our nation's leaders must develop a strategy for excellence that recognizes the necessity of change for the growth of our economy. The growth of the high-tech industry, as described in this chapter, is one such change. Yet, despite the promising job opportunities and high wages offered by the high-tech industry, today's students -- tomorrow's workforce -- are not acquiring the skills necessary to take advantage of it. Our federal government can do better. Our nation's leaders must ensure that America has a workforce qualified and trained to take advantage of tomorrow's opportunities. Our educational system must improve in preparing workers to enter

the workforce. And government policies must support life-long learning so that workers can meet the challenges of a changing workplace.

In addition, government must recognize that today's high-tech workers may require different working arrangements than those of the industrial age. Policy-makers must review and revise existing legislation and regulation to eliminate out-dated and inflexible mandates while preserving necessary worker protections.

Elements of the 1997 budget agreement -- a moratorium on new Internet taxes, increases in the H-1B Visa cap -- show that our policy-makers realize the importance of the high-tech industry to our nation's economy. Our nation's workforce and policy-makers can ill-afford to disregard an industry that holds so much promise for the future.

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[1] RICHARD W. JUDY and CAROL D'AMICO, WORKFORCE 2020, (Hudson Institute 1997).
[2] *How It Really Works*, Business Week, August 7, 1997.
[3] Michael Mandel, *Taking Its Place In The Pantheon*, Business Week, August 7, 1997.
[4] Business Week, August 25, 1997.
[5] COMPUTER SYSTEMS POLICY PROJECT, GUIDE TO GLOBAL ELECTRONIC COMMERCE READINESS, (July 1998).
[6] Id.
[7] Id.
[8] Id.
[9] AEA, CYBERNATION.
[10] The amount of dollars invested by foreign countries in R&D is unavailable.
[11] Id.
[12] Information Technology Association of America and Virginia Polytechnic Institute and State University, *Executive Briefing of a Study on IT Workforce Shortages.* Findings are based on responses to a telephone survey of 532 representatives of companies which employ information technology workers.
[13] Id.
[14] Id.
[15] National Alliance of Business, *High Stakes, High Skills, Workforce Economics*, September 1997.
[16] Id.
[17] Michaela Platzer, *America's High-Tech Workforce*, AEA, June 1998.
[18] Id.
[19] Id.
[20] Id.
[21] Id.
[22] Id.
[23] Id.
[24] Associated Press, *Interest Low in Computer Majors*, USA Today, August 19, 1998.
[25] Elizabeth Wiese, *America's Online: 70.5 Million Adults*, USA Today, August 25, 1998.
[26] AEA, CYBERNATION.
[27] Id.